Department of Mathematical Sciences

Spring 2016

Colloquium Series

Wednesday, March 2 , 2016 at 3pm in Bell Hall 143

Note the unusual colloquium day

Candidate for Computational Science faculty position

Dr. Ben Nolting

Case Western Reserve University

Balls, cups, and quasi-potentials: A new mathematical framework for understanding ecosystem stability

Many ecosystems exhibit abrupt shifts between alternative stable states. For example, a lake can rapidly transition from a healthy, diverse state to a eutrophic, algae-dominated state, and a savanna can quickly switch from an open, grassy state to a dense, woody state. In this talk, I describe how a concept from stochastic analysis called the quasi-potential provides a helpful framework for studying ecological models with alternative stable states. This framework yields predictions about the probability, frequency, duration, and dynamics of ecosystem shifts, and it provides a new way of understanding the concept of stability in ecology. Calculating quasi-potentials requires using specialized numerical techniques to find viscosity solutions of a specific class of Hamilton-Jacobi equations. I will explain how my collaborators and I have addressed these computational challenges and made this framework accessible to ecological modelers.

For further information, please contact Drs. Emil Schwab or Xiaogang Su, eschwab@utep.edu or xsu@utep.edu